

mating. Similarly it is only by selected inbreeding that any increase in the numbers of tumors in a strain can be produced. Thus, SLYE (*Jour. Cancer Res.*, 1920, v, 53), by selected inbreeding (mating brother and sister of a hybrid strain carrying a definite percentage of cancer) in three branches obtained new strains with widely varying cancer incidence. One branch gave a tumor-free line, a second yielded a heterozygous line (*i. e.*, mice not themselves developing cancer but carrying it potentially) while the third was an extracted tumorous line. Since the progenitors of each line were brothers and sisters, and they were bred in the same manner, inbreeding, *per se*, was obviously not a factor in occasioning an increase in cancer. "What is put into a mating, and not the manner of putting it in, determines what characters shall appear in the offspring." It was shown that inbreeding, by lowering the vitality and diminishing the fertility of a strain, could eliminate cancer by racial extermination. It is important, in the analysis of results on the incidence of cancer, either spontaneous or inoculated, to bear in mind that the lowering of the vitality of a strain through inbreeding as well as by the hybridizing of stock which gives rise to inferior and infertile strains tends to decrease the percentage of cancer within the strain. The author maintains that "in the demonstration of the inheritability of cancer and other tumor types in mice their inheritability for man and every other species in which they occur has also been demonstrated." Further, since cancer and non-cancer tendencies segregate out and are transmitted as such in hybrid crosses, cancer being a recessive, can be eliminated from the human race, where the matings are hybridizations, by selected mating.

**Varieties of Streptococci with Special Reference to Constancy.**—CLAWSON (*Jour. Infect. Dis.*, 1920, xxvi, 93) in a study of strains of streptococci isolated from various sources, paid particular attention to the constancy of the special characteristics, such as peculiarities of morphology, action on the blood-agar plate, fermentation of various carbohydrates, agglutination and complement-fixation reactions, in an attempt to discover whether the various classes adopted by previous workers have sufficient relationship to source, habits, pathogenesis or other particular characteristic to justify such grouping. From the author's investigations there seems to be no direct relationship between the length of chains and pathogenesis in streptococci. Capsules were found less commonly among hemolyzers than among non-hemolyzers. Of the 134 strains, hemolysis was constant after nearly two years of artificial cultivation, only 4 regularly failed to ferment lactose, only 2 always fermented mannit and only 3 always failed to ferment salicin. Evidence pointed to the fact that all non-hemolytic strains were met-hemoglobin producers when grown on suitable mediums, and of 150 non-hemolytic strains investigated, only 5 always failed to ferment lactose, 36 always fermented mannit and 75 always fermented salicin, there seeming to be more uniformity of fermentation among hemolytic than non-hemolytic streptococci. The regular type of fermentation placed most of the non-hemolysers in the class of *S. mitis* and *S. salivarius* (Holman). Considering the lack of relationship between fermentation reactions and source or pathogenesis, and the wide distribution of organisms falling into non-hemolytic groups, the author believes it is

doubtful whether any of the smaller groups of non-hemolytic streptococci deserve a place in classification. He also prefers the term *S. hemolyticus* to *S. pyogenes* and *S. viridans* to *S. buccalis* (Blake). It was further found that agglutination reaction between hemolytic organism and homologous serum showed a high degree of uniformity, while the reactions of hemolytic serum with non-hemolytic organisms, non-hemolytic serum with hemolytic organisms or non-hemolytic serum with non-hemolytic organisms, except the homologous strains, gave a low percentage of positive results. The reaction of hemolytic serum with hemolytic antigen yielded a higher percentage of complement-fixation than those of hemolytic serum with non-hemolytic antigen, or non-hemolytic serum with non-hemolytic antigen, or non-hemolytic serum with hemolytic antigen. From these observations it is concluded that the hemolytic group is a homogeneous group in which there is a relatively high degree of constancy and that the non-hemolytic group is heterogeneous or less homogeneous than the hemolytic group.

#### Observations on Paratyphoid Bacilli Recently Isolated from Animals.

—In a recent study of the tissues of several hundred swine which died of enteric diseases, SPRAY (*Jour. Infect. Dis.*, 1920, xxvi, 340) found the predominating bacterial flora to be members of the paratyphoid-enteritis group. The materials for study were obtained either from diarrheal swine by routine inoculations from heart blood, lung, liver and spleen, kidney and mesenteric glands, or from hog cholera virus by directly plating or inoculating the virus blood into rabbits. In the case of diarrheal swine the identity of all paratyphoid strains isolated from the various organs of the same carcass was not to be assumed, because in at least three instances, two or even three distinct strains were isolated from the same body. With few exceptions the strains were readily classified. Forty strains were studied in detail by the employment of arabinose, xylose, dulcite, inosite, lead acetate agar, glucose serum water and agglutination and absorption tests; 23 of the forty strains were recovered from the tissues of diseased swine; 8 from hog cholera virus blood by plating and 9 from rabbits dying after inoculation with virus blood known to contain gas-producing bacteria. It was found that 34 of the 40 strains so studied were *B. suis*, 2 were identical with human *B. paratyphosus A*, 2 with human *B. paratyphosus B* and 2 were intermediate between *B. suis* and *B. paratyphosus B*. *B. enteritidis* was not encountered at any time. No true representative of the paratyphoid enteritis group was isolated from the feces nor from the lumen of the intestines. The author emphasizes this as he does the value of the selective cultural media mentioned above.

**The Comparative Oxygen Avidity of Normal and Malignant Cells Measured by Their Reducing Powers of Methylene Blue.**—An interesting comparison of the reducing power of normal tissue and that of tumors is made by DREW (*British Jour. Exper. Path.*, 1920, i, 115) by means of methylene blue. A measured quantity (0.3 to 0.5 c.c.) of minced tissue was placed in a tube to which was added a definite amount of 0.001 per cent. methylene blue in Locke's solution minus the glucose. In order to prevent reoxidation a layer of paraffin was poured over each tube, which was then incubated at 37° C. During incubation the methylene blue became reduced to methylene white

by the tissue. The reduction commenced in the layer of the solution next the tissue and gradually extended upward in the column of colored fluid. While slight variations in the rate at which the reduction proceeded upward in each tube occurred with individual tissues, a very marked difference was observed between the tubes containing normal and tumor tissue. When the reduction rate was represented by means of a graph, two types of curves, which differed widely from one another, were obtained. In normal tissue the maximum reduction occurred in the first hour and gradually decreased in rate until the fourth hour, when the minimum was reached. The tumor tissues used were mouse carcinoma, mouse sarcoma, rat sarcoma and mammary carcinoma from a human subject. The reduction produced by tissues of these tumors showed a minimum during the first three hours and a small increase in the fourth and fifth hour, when it finally ceased. The only exception among the tumors was a neoplasm containing a considerable quantity of glycogen. In this case the curve tended to approximate that found in normal tissue. The curves obtained with methylene blue could be duplicated when hemoglobin was substituted for the dye, and the author concludes that the difference between the two types of curves is to be explained by the fact that the tumor cells have a lower oxygen avidity than the normal cells.

**The Human Fecal Streptococci.**—Frequent and fragmentary allusions to the occurrence of streptococci in the gastro-intestinal tract have appeared in the literature. Most studies have had to do with the cause of specific diseases and consequently have presented difficulties of evaluation, often tending to complicate rather than simplify the situation. In an attempt to establish the normal streptococcal flora of the alimentary canal in accordance with the recent methods of classification, OPPENHEIM (*Jour. Infect. Dis.*, 1920, xxvi, 117) examined 55 apparently normal stools from fifteen healthy persons from which 323 strains of streptococci were isolated. The number of samples from any one individual varied from 1 to 5 and the number of strains isolated ranged from 11 to 49. The usual number of samples from one person was 4 and the average number of strains from these 4 was approximately twenty. The method of culture consisted in diluting a few loops of feces in sterile salt solution and streaking the surface of a 10 per cent. sheep blood-agar plate. After eighteen to twenty-four hours' incubation at 37° C. colonies were fished to glucose broth and reincubated. Replatings were made from the broth and the colonies picked to blood-agar slants, from which the carbohydrate media were seeded and read in five days. Meat infusion broth, pH. 7.5, was employed. The carbohydrate medium was 1 per cent. except salicin (0.5 per cent.), and bromcresol purple served as the indicator. Hemolytic and "indifferent" varieties of streptococci were rarely found. The green-producing strains were most frequently encountered, and of these all fermented glucose, 8 failed to ferment lactose, 9 failed to ferment salicin and 4 failed to ferment mannit. According to Holman's classification, *S. faecalis* occurred in 73 per cent., *S. salivarius* in 1 per cent., *S. non-hemolyticus* I in 23 per cent., *S. equinus* and *S. ignavus* in 1.5 per cent. Mannit fermentation, though the most important fermentative characteristic, was found to be quantitatively less uniform than that of

other carbohydrates. No apparent morphologic characteristics aside from those dependent on rapid, luxurious growth, characterized the strains isolated.

## HYGIENE AND PUBLIC HEALTH

UNDER THE CHARGE OF

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A Study of the Relation of Diet to Pellagra Incidence in Seven Textile-mill Communities of South Carolina in 1916.—GOLDBERGER, WHEELER and SYDENSTRICKER (*Public Health Reports*, 1920, xxxv, 648) set out to determine the explanation for the outstanding fact, observed many years ago, that poor diet was associated with pellagra. Goldberger had earlier called attention to the significance of the fact that nurses and attendants, at institutions where pellagra was rife, appeared to be immune. A study of the conditions showed that the apparently immune used a diet containing less cereal and vegetable components, and more fresh meats, eggs and milk. Experimental studies clearly showed that when the diet of inmates was supplemented so as to contain a larger proportion of animal protein foods the disease disappeared. In one institution the diet of certain patients was supplemented in the manner indicated, while that of others was not changed, with results that clearly proved the prophylactic benefit of the more liberal diet. By feeding a faulty diet to volunteer convicts it was possible to induce pellagra among those, while ten other prisoners remained free. In the present study accurate observations were made on the diet used by pellagrous and non-pellagrous families and on the economic and sanitary circumstances. Special stress was laid on the necessity for data on dietary conditions in the months prior to the annual appearance of pellagra which reaches its height in June. The seven villages were typical cotton-mill communities ranging in population from 500 to 800 inhabitants, practically all of native-born Anglo-Saxon stock. House-to-house visits were made for the purpose of discovering cases that otherwise would have escaped observation; in addition, cases were reported by physicians, though apparently but a small percentage of cases came under medical care. Only cases with a clearly defined eruption were counted as pellagra, though the authors believe that by adhering to this criterion some cases were excluded. The data for basis of the dietary studies were based on records of the purchases or production of food consumed by a household. The outstanding difference between pellagrous households and others lay in the more liberal supply of foods of the animal protein group in the latter. Just what component of these foods is essential in the prevention of pellagra remains to be determined. The results of the study give no support to the theory that